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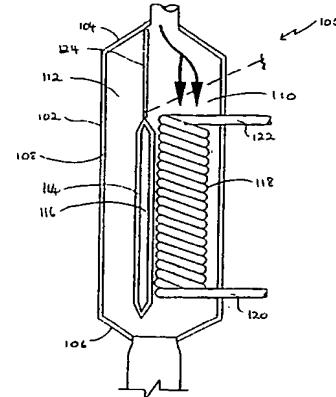
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(54) ECHANGEUR DE CHALEUR POUR ECHAPPEMENT DE VEHICULE A MOTEUR  
(54) HEAT EXCHANGER FOR MOTOR VEHICLE EXHAUST

(57)

A heat exchanger for a motor vehicle exhaust includes a tubular body having a first end, a second end, a peripheral sidewall, and at least two flow passages that extend between the first end and the second end. The at least two flow passages include at least one heat exchange fluid flow passage and at least one bypass fluid flow passage. A heat exchange coil is positioned in the at least one heat exchange fluid flow passage. The heat exchange coil has an inlet and an outlet extending through the sidewall of the tubular body. A valve is provided for selecting between the at least one heat exchange fluid flow passage and the at least one bypass fluid flow passage.



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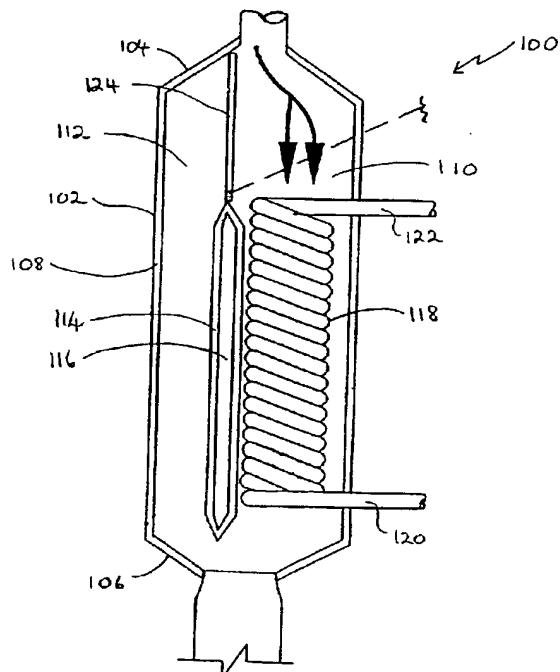
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UNITED STATES/CANADA

ABSTRACT OF THE DISCLOSURE

A heat exchanger for a motor vehicle exhaust includes a  
5 tubular body having a first end, a second end, a peripheral  
sidewall, and at least two flow passages that extend between  
the first end and the second end. The at least two flow  
passages include at least one heat exchange fluid flow passage  
and at least one bypass fluid flow passage. A heat exchange  
10 coil is positioned in the at least one heat exchange fluid flow  
passage. The heat exchange coil has an inlet and an outlet  
extending through the sidewall of the tubular body. A valve  
is provided for selecting between the at least one heat  
exchange fluid flow passage and the at least one bypass fluid  
15 flow passage.

TITLE OF THE INVENTION:

Heat Exchanger For Motor Vehicle Exhaust

NAME(S) OF INVENTOR(S):

5 Easton Bennett

FIELD OF THE INVENTION

The present invention relates to a heat exchanger for a motor vehicle exhaust

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BACKGROUND OF THE INVENTION

In Canadian Patent Application No. 2,185,076 (U.S. Patent 5,799,632) Easton Bennett disclosed a novel heat exchanger configuration for a motor vehicle exhaust. This heat exchanger 15 had an exhaust pipe with a flow passage formed of a coil of tubing. The exchange medium flows through the coil as hot exhaust gases flow through the flow passage in the centre of the coil.

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In Canadian Patent Application No. 2,247,759 (U.S. Patent Application No. 09/158,711) Easton Bennett disclosed an improvement to the novel heat exchanger configuration. This heat exchanger had the coil of tubing with the central flow passage positioned in a larger housing, thereby forming an 25 annular flow down the outside of the coil of tubing, in addition to the central flow passage. This configuration proved to be even more efficient for heat transfer.

In some applications, however, there is a concern that the 30 heat exchanger will work too well and the coolant used as exchange medium will become over heated.

SUMMARY OF THE INVENTION

35 What is required is an alternative configuration of heat exchanger for a motor vehicle exhaust.

According to the present invention there is provided a heat exchanger for a motor vehicle exhaust which includes a tubular body having a first end, a second end, a peripheral sidewall, and at least two flow passages that extend between the first end and the second end. The at least two flow passages include at least one heat exchange fluid flow passage and at least one bypass fluid flow passage. A heat exchange coil is positioned in the at least one heat exchange fluid flow passage. The heat exchange coil has an inlet and an outlet extending through the sidewall of the tubular body. A valve is provided for selecting between the at least one heat exchange fluid flow passage and the at least one bypass fluid flow passage.

The heat exchanger, as described above, has a normal operating mode in which all exhaust gases are diverted through the heat exchange fluid flow passage to effect a heat exchange with fluid flowing through the heat exchange coil. However, when such a heat exchange is not desired, the valve is repositioned to divert all exhaust gases through the bypass fluid flow passage. It is also possible to put the valve in an intermediate position to have only a portion of the exhaust gases flow through the heat exchanger flow passage, as will hereinafter be further described.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of the invention will become more apparent from the following description in which reference is made to the appended drawings, wherein:

30 **FIGURE 1** is a top plan view, in section, of a heat exchanger for a motor vehicle exhaust constructed in accordance with the teachings of the present invention, with a valve positioned in a heat exchanger mode.

35 **FIGURE 2** is a top plan view, in section, of the heat exchanger for a motor vehicle illustrated in **FIGURE 1**, with the valve positioned in a heat bypass mode.

**FIGURE 3** is a top plan view, in section, of the heat

exchanger for a motor vehicle illustrated in **FIGURE 1**, with the valve positioned in an intermediate mode.

5 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

The preferred embodiment, a heat exchanger for a motor vehicle exhaust generally identified by reference numeral 100, will now be described with reference to **FIGURES 1 through 3**.

10 Referring to **FIGURE 1** through **3**, heat exchanger for a motor vehicle exhaust 100 includes a tubular body 102 having a first end 104, a second end 106, a peripheral sidewall 108, a heat exchange flow passage 110 and a bypass flow passage 112. Each of heat exchange flow passage 110 and bypass flow passage 15 112 extends between first end 104 and second end 106. A dual wall 114 that has an insulating air flow cavity 116 is positioned between heat exchange fluid flow passage 110 and bypass fluid flow passage 112. A heat exchange coil 118 is positioned in heat exchange fluid flow passage 110. Heat 20 exchange coil 118 has an inlet 120 and an outlet 122 extending through sidewall 108 of tubular body 102.

A pivotally movable valve member 124 is provided for selecting a path of fluid flow. Referring to **FIGURE 1**, when 25 valve member 124 is in a first limiting position, fluid flows through heat exchange fluid flow passage 110. Referring to **FIGURE 2**, when valve member 124 is in a second limiting position, fluid flows through bypass fluid flow passage 112. Referring to **FIGURE 3**, when valve member 124 is in an 30 intermediate position, fluid flow is divided between heat exchange fluid flow passage 110 and bypass fluid flow passage 112.

The use and operation of heat exchanger 100 will now be 35 described with reference to **FIGURES 1 through 3**. Heat exchanger 100 is designed to be used when one wishes to raise the temperature of automotive fluids or decrease the

temperature of hot exhaust gases. This is accomplished when valve member 124 is positioned as illustrated in **FIGURE 1**. In cold weather conditions, it is advantageous to preheat fluids used in the in car heater or engine oil. Hot exhaust gases 5 from the exhaust system provide a ready source of heat for this purpose. The automotive fluid to be preheated is circulated through heat exchange coil 118. In hot weather conditions, the heat generated by exhaust gases is sometimes so extreme that it fatigues and causes failure of some components. In such 10 circumstances it is advantageous to draw heat away from the hot exhaust gases. Heat exchange coil 118 is used to circulate fluids which draw heat from the hot exhaust gases. When conditions change it may be necessary to stop further heat exchange from occurring or quantitatively reduce the heat 15 exchange. To prevent the heat exchange from occurring, valve member 124 is placed in the position illustrated in **FIGURE 2**. To reduce the magnitude of the heat exchange, valve member 124 is placed in the position illustrated in **FIGURE 3**.

20 It will be apparent to one skilled in the art that modifications may be made to the illustrated embodiment without departing from the spirit and scope of the invention as hereinafter defined in the Claims.

**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY  
OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

- 5 1. A heat exchanger for a motor vehicle exhaust, comprising:  
a tubular body having a first end, a second end, a peripheral sidewall, and at least two flow passages that extend between the first end and the second end, the at least two flow passages including at least one heat exchange fluid flow passage and at least one bypass fluid flow passage;  
a heat exchange coil positioned in the at least one heat exchange fluid flow passage, the heat exchange coil having an inlet and an outlet extending through the sidewall of the tubular body;
- 10 15 a valve for selecting between the at least one heat exchange fluid flow passage and the at least one bypass fluid flow passage.
- 20 2. The heat exchanger as defined in Claim 1, wherein an insulating barrier is positioned between the at least one heat exchange fluid flow passage and the at least one bypass fluid flow passage.
- 25 3. The heat exchanger as defined in Claim 2, wherein the insulating barrier is a dual wall with an air barrier positioned inbetween.

4. A heat exchanger for a motor vehicle exhaust, comprising:
  - a tubular body having a first end, a second end, a peripheral sidewall, and at least two flow passages that extend
  - 5 between the first end and the second end, the at least two flow passages including at least one heat exchange fluid flow passage and at least one bypass fluid flow passage, with a dual wall having an insulating air flow cavity positioned between the at least one heat exchange fluid flow passage and the at
  - 10 least one bypass fluid flow passage;
  - a heat exchange coil positioned in the at least one heat exchange fluid flow passage, the heat exchange coil having an inlet and an outlet extending through the sidewall of the tubular body;
  - 15 a pivotally movable valve member for selecting between the at least one heat exchange fluid flow passage and the at least one bypass fluid flow passage.
5. The heat exchanger as defined in Claim 4, wherein the valve
- 20 member has an intermediate position in which the flow is divided between the at least one heat exchange fluid flow passage and the at least one bypass fluid flow passage.

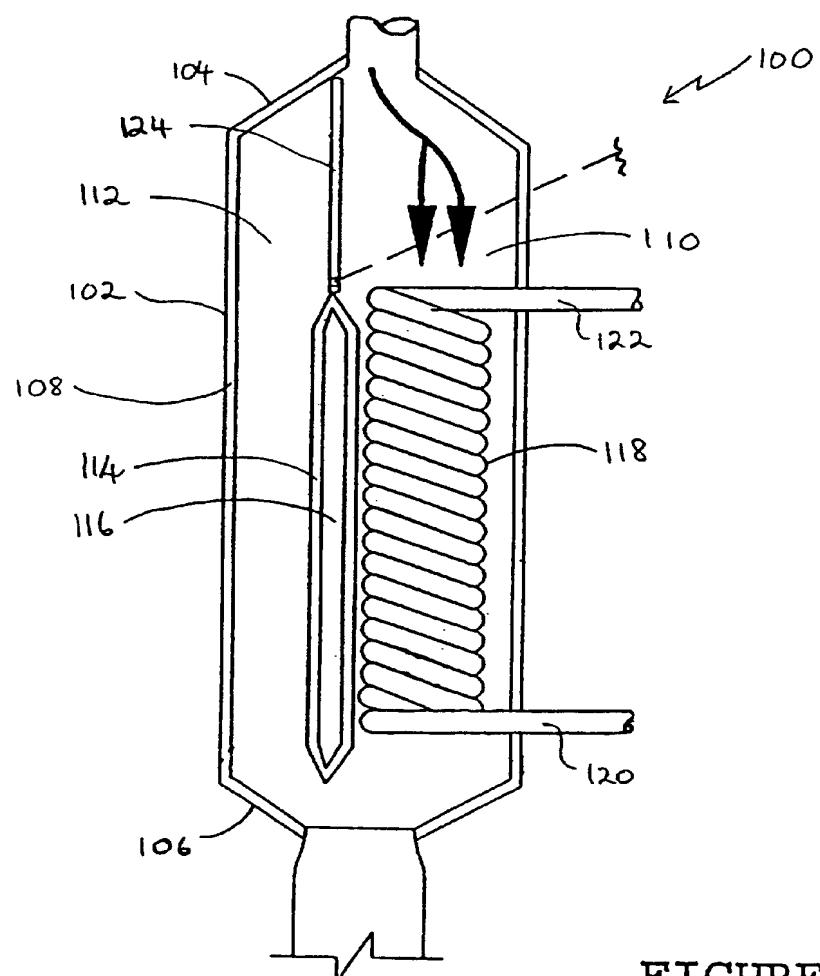


FIGURE 1

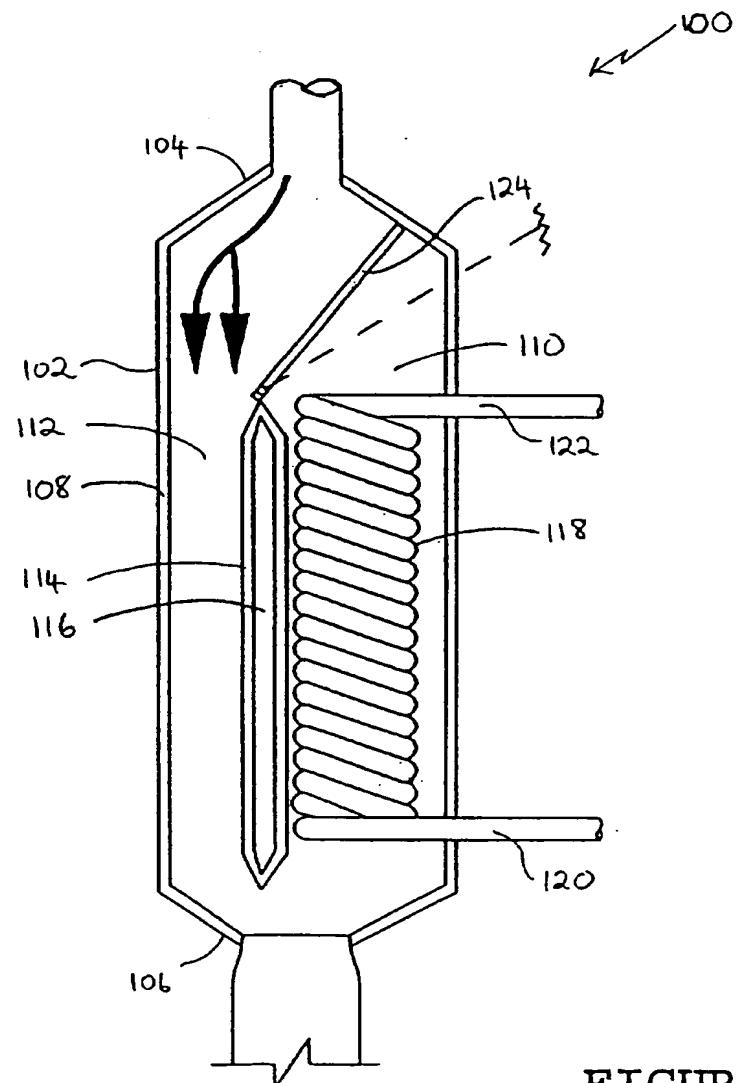


FIGURE 2

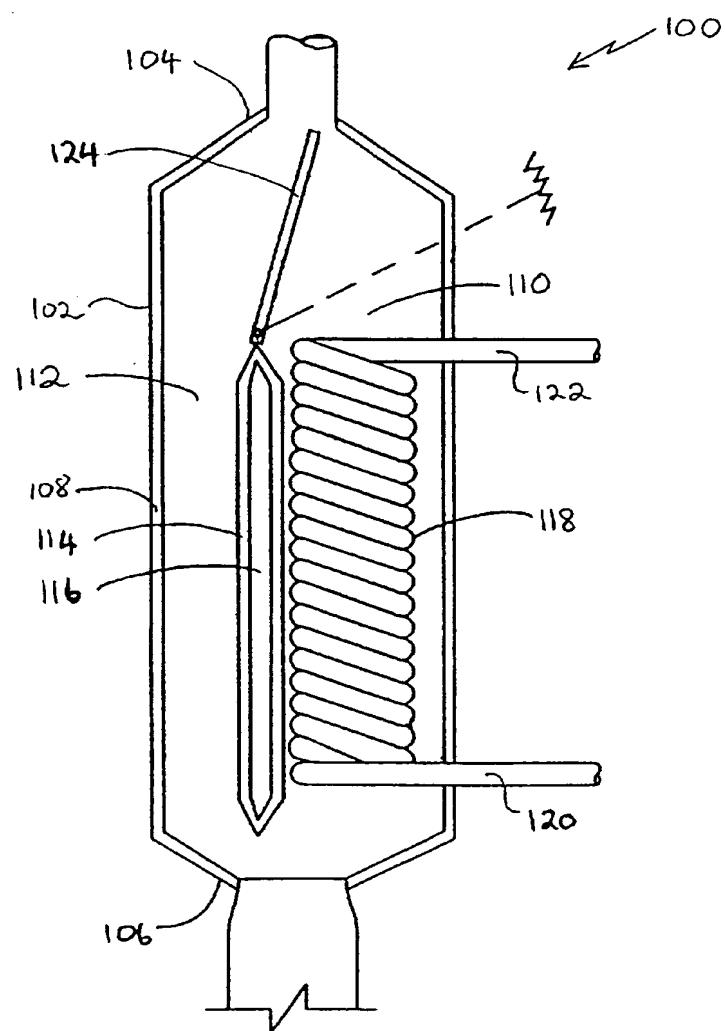


FIGURE 3